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ABSTRACT

Teacher and administrator feedback about a study on computer-assisted instruction (CAI) is described in this report. The hypotheses, methodology, and conclusions of the overall program are briefly discussed as they pertain to the feedback aspect. (The CAI program dealt with the effects of choice situations upon the students' engagement in learning. Subjects were chosen from Grade 4 and 5 classes in a low income area elementary school.) Since the experiment depended on evaluation by observation, the researchers felt it necessary to have a good operational rapport with the school personnel. The teachers provided information that verified some of the researchers' expectations concerning the effect of social determinants on choice behavior. This report was compiled from information collected by questionnaire and discussion. (MC)

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# Strategies for Developing Reciprocity Between Educational Researchers and School Personnel: Providing Teachers with Feedback on Students' Computer Assisted Instruction Performance

By

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This paper describes the results of a research feedback session held with some teachers and administrators from Mayfair elementary school which is located in a low-income area of San Jose, California. This meeting occurred at the Stanford Center for Research and Development in Teaching approximately six months after the completion of the first phase of our CAI project. The Mayfair school staff was invited to participate in this meeting in order to: discuss any problems created in the school by our research activities, hear about the results of the project, offer their interpretations of the data and make suggestions about directions for future research.

The primary objective of this research was to investigate the effects of choice situations upon students' engagement in learning.[1] We utilized a Computer Assisted Instruction program to study choice situations which occurred while the children worked arithmetic drill exercises, and evaluated their engagement levels with an observational scale that measured how intensively they attended to the learning task. The children could work on the CAI problems during ten one-half hour daily sessions. They could also stop working after every five minute block of problems was presented during each session or completely refuse to work on the computer any time within the ten day period. The subjects were randomly selected from four fifth grade classes and one fourth grade class at Mayfair school and placed in either Choice or Non-choice conditions: (1) The Choice condition (N=30) gave them the option of selecting pro-

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[1] See Appendix A for a more detailed description of the research design.

blems that were "harder", "easier", or of the "same" difficulty levels than they worked during the previous five minute period, (2) and the Non-choice condition (N=21) was fixed at approximately the 70% correct level during most of their time on the computer. Continuous observations occurred within 10 second blocks of time while the children worked on the machines and these data were utilized to measure their levels of engagement and disengagement.

The research staff met with three administrators, two teachers and an aide (who represented another teacher) during a Saturday morning session which was approximately three hours long. The data were presented in the following order:

(1) Results of the Engagement Observation Scale -- These data showed no significant differences in engagement or disengagement levels between the Choice and Non-choice groups. However, there were striking individual variations in these levels which occurred on a daily basis.

(2) Choice of Difficulty Levels Data -- About one-half of the children in the first condition demonstrated two unusual types of choice patterns. The first pattern occurred when certain children continually selected easier problems although they were answering most of their previously worked problems correctly (Maximizers). This pattern resulted in their receiving arithmetic problems at grade levels which could not improve their academic performance. The second pattern occurred when children selected more difficult problems although their previous performance was less than 65% correct (Minimizers). The children in this sub-group performed poorly during most of their time on the computer.

(3) Interview Data -- The children were asked why they decided to stop working on the computer and why they chose certain types of problems. These data indicated that many of the children stopped working because they wanted to complete certain classroom assignments. The most important interview finding was that the Minimizers said they chose "harder" problems because they wanted more "grown-up" types of problems.

(4) Achievement Test Results -- The primary goal of our research was to measure changes in student engagement rather than achievement. We reported these pre and post test results only to inform the Mayfair staff about the children's achievement levels during the time of the experiment. We did not expect differences in achievement to occur between our Choice and Non-choice conditions or between the children who worked and those who did not work on the computer. Our expectations were confirmed since there were no significant differences between these groups.

The participants were asked to comment on the data after each one of the four presentations was completed. The information reported in this paper is based upon the responses made during these periods and during a general discussion near the end of the session. A questionnaire was also administered (following the completion of the session) which asked about the significance of our research and the usefulness of the feedback session.[2] Some of the responses to this questionnaire are also re-

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[2]Appendix B contains a copy of this questionnaire.

ported in this paper. However, it should be emphasized that all of the topics which were discussed and commented upon are not described in this paper. Inst ad, the author only included the topics which he believed would improve our relationships with Mayfair school and help us to interpret our results.

## Outcome of the Meeting

Did the results of this meeting demonstrate that feedback sessions can be mutually advantageous to both researchers and teachers? First, the teachers offered helpful recommendations concerning how to improve some of our research procedures and interpret some of our findings. Secondly, we clarified some of the curriculum options which can be used with the CAI programs, and outlined specific steps that the teachers should take in order to more effectively use the CAI system.

Procedures and Interpretations. Regarding the first point, there were three problem areas related to the experimental procedure which the teachers and administrators discussed with us:

(1) It was difficult to determine whether the children terminated their computer work because they were disengaged from the task or certain pressures and attractions in the classroom "demanded" that they leave the CAI room. The teachers confirmed our impression that particular classroom activities caused some of the children to leave earlier than required and they advised us to modify our CAI schedule in a manner that would not conflict with classroom activities. This suggestion can

be easily implemented during this year's research program, since the time for running children is more flexible than it was last year.

(2) Our group achievement testing procedure seemed unreliable because many of the children became restless and left the testing room before their allowed time elapsed. These tests were administered by members of our research staff or the observers outside of the children's classrooms. The Mayfair teachers recommended that we use the school achievement tests because their administration conditions were more constant than our conditions, and the teachers were more aware of vocabulary problems which might interfere with the children's understanding of the testing procedure. It was also suggested that the children understood our test results would not affect their academic progress. Therefore, their motivation to perform successfully was probably lower than usually expected.

Clearly, teacher administered tests can reflect biases that yield unreliable and invalid scores. However, we are primarily interested in utilizing pre-test scores for sampling and matching purposes, and these achievement tests are probably less influenced by "coaching", "teaching for the test" and other biasing factors at the beginning of the school year than near the end. In addition, the teachers had more control over their pupils' test behavior than we did. Therefore, this recommendation will be followed by eliminating our achievement testing schedule.

(3) We introduced an interview technique into our study in order to determine why the children stopped working on the computer, why they made certain choices of problems and what they thought about working

arithmetic problems on the computer. However, many of their responses seemed to be more positive or less negative than expected. One administrator stated that we might redesign our interview technique in order to determine whether the children refuse to give negative responses because they are pressured by the interview situation and the phrasing of our questions. His proposal requires the use of negatively phrased statements such as, "The computer didn't always give you what you asked for." About one-half of the children would receive these statements while the other half would receive the standard interview questions. Comparisons between the frequencies of agreements and disagreements with the interviewer would indicate how intensively the children's explanations of their behavior were affected by pressures to agree with the interviewer. We have not followed this suggestion because our current interview questionnaire includes projective measures which will probably enable us to evaluate the effects of social influences upon the children's responses. However, two other suggestions made by an administrator and teacher will be implemented. They thought that we should ask the teachers about: the meanings of key words which children use in responding to the interview questions, and the types of statements the children make about CAI upon returning from the computer room.

The teachers' interpretations of our data are even more helpful than their procedural recommendations because they indicate whether our findings are generalizable from the laboratory setting to the classroom. Thus, we wanted to know if the choice patterns which occurred on the computer are expected behaviors in other choice situations. If the teachers

were familiar with these choice patterns, then we asked for their explanations of why some children continually chose "harder" problems and others continually chose "easier" ones.

According to the teachers, these types of choice patterns can occur in the classroom and they appear to be more closely related to children's social status considerations than their academic performance. One teacher said that his pupils were more concerned with the grade level of their workbooks instead of the number of problems which they answered correctly. In this regard, the children will ask each other whether they "have" a certain book rather than whether they can read the book effectively.

What social pressures motivate children to select problems which are educationally inappropriate for them? The same teacher said that most of the children in our study have experienced a long process of academic failure and were performing at about two grades below the fifth grade level. Therefore, they might derive social prestige from conspicuous indicators of academic success which can result in failure. For example, working in a book that is congruent with their grade level is desirable because they will at least fail in a "socially prestigous" manner.

Another factor which this teacher said would influence the children's choice patterns is related to his teaching objectives. Thus, he stated that the children must first be taught to "work hard" since they will probably learn something if they develop this orientation towards work. The pressure to "work hard" might have also influenced the

children who selected more difficult problems although they continually answered them incorrectly. Hence, the children in this group might have fulfilled their social prestige needs among both their peers and teachers by selecting these types of problems. Increased social prestige among their peers might have occurred because they were working problems at or above their grade levels (related to the first point discussed by our teacher). In addition, the children might have obtained prestige from their teachers by "working hard" on the computer, i.e., selecting difficult problems.

Why did certain children pick "easier" problems which did not improve their grade level standings? The interpretations of this second choice pattern were not as extensive as those given for the first pattern and did not emphasize the social implications of making choices of "easier" problems. However, it was suggested that the children in this sub-group were from families that did not develop a strong work ethic among their children.

The teachers' and administrators' explanations of different choice patterns reinforced our belief that certain social factors can influence CAI performance. Their descriptions of some of the social factors which affect classroom behavior indicated that we are investigating a general phenomenon which appears to have important influences upon different types of academic situations. Therefore, the discussion of this topic has caused us to focus our future research efforts upon identifying some of the social influences (from parents, teachers and peers) which might affect children's decision-making behaviors. Furthermore, the teachers' statements have also indicated that we should design methods for train-

ing children to make effective choices. In this regard, the application of our research findings to designing a training program would probably result in the more extensive application of our results to improving classroom instruction.

Effective Use of the CAI Terminals. Our contract with Mayfair school specified that the teachers could run children on the terminals who were not involved in the study. The actual time allotted for general school use was between 8:00-9:00 A.M. and after 1:00 P.M., and the assistant principal was responsible for scheduling and supervising children during these intervals. However, the teachers wanted to learn more about the types of programs and options which are available. For example, the Math, Drill and Practice program can be set at different grade levels according to a child's abilities in about fourteen areas of arithmetic. It was concluded that the teachers should first decide how much time they want their children to devote to CAI and what types of exercises they would like them to receive. After this initial planning, a meeting can be held with the computer programmers and the research staff in order to implement these plans.

## Results of the Questionnaire

The teacher questionnaire was designed by Ruby Knowles who supervises our program's classroom studies of student engagement. The questionnaire was administered to the school personnel who attended the feedback session and two other teachers who participated in last year's study

but were unable to be at our meeting. The questionnaire concentrated upon three areas of interest:

(1) Working Relationships between School Staff and Researchers

(2) Usefulness of the Project in On-going Teacher and Student Activities

(3) Relevance of the Workshop Presentations to Classroom Teaching

The data from this questionnaire will be reported in terms of the responses which provide us with new information about the amount of success we had in communicating the project's goals and activities to the teachers.

The first section indicated that the teachers obtained much of their information about the project from our observers. Although the observers were not trained to give such information, it appears that their informal contacts helped the teachers to understand the project's goals and activities. Obviously, these contacts can become more systematic this year in order to improve the current participants' understanding of our project.

The teachers and administrators also stated that we should meet with them more frequently in order to effectively coordinate the CAI study with the students' classroom work. For example, the assistant principal said that the research staff should "...be and feel like a part of our educational team at Mayfair." The need for more coordination between the CAI and classroom curricula was again emphasized in section two of the questionnaire (Usefulness of the Project in On-going School Activities), since two of the five individuals directly concerned with teaching were uncertain that "...what the students learned was consistent with their objectives and content for arithmetic in the classroom." In

addition, all of the teachers believed that the students who participated in the CAI project were not more engaged in their arithmetic lessons in the classroom than the students who were uninvolved in the research. However, these teachers demonstrated their interest in CAI by allowing their pupils to work on the teletypes when they were not being used by the researchers.

The apparent interest of the teachers in CAI and their desire to work more closely with our staff suggest that future programming should concentrate upon the arithmetic topics which are being taught in the classroom, and either the program or teacher could "lead" the presentation of these materials. The movement of our project in this direction requires a more sophisticated stage of reciprocity between researchers and teachers than presently exists. The first stage of our relationship was a trial-and-error period which concentrated upon setting up the technical apparatuses of Computer Assisted Instruction and introducing a suitable schedule for conducting this research. Following the resolution of these problems, we then concentrated upon involving the school in using the terminals for non-experimental children who needed arithmetic drill exercises. Thirdly, the feedback session moved us into a stage of reciprocity which enabled the teachers to evaluate the validity of our work. These evaluations appear to be positive and they suggest that a new stage in our relationships should emerge in order to provide the teachers with useful research findings. Some of the activities in the fourth stage might include developing a program for training children to make effective choices and assisting teachers in utilizing

choice situations to improve academic performance.

The last section of this questionnaire concentrated upon determining whether the meeting produced useful information for the teachers. Four out of five respondents believed that the most useful information was concerned with the choice data because the findings in this area of research can produce changes such as "improving student interest in learning" and producing more "individualized programs for children." However, only one teacher said that she would change some of her teaching methods as a result of the workshop, and none thought that the results could definitely be applied to improving student interest and motivation. In contrast, all of the participants stated that: (1) educational research can produce useful knowledge, and (2) they would consider participating in future research projects conducted by our staff.

## Conclusion

It appears that this feedback session produced two types of beneficial information which can have a positive influence upon our project's future direction and is generalizable to other research projects in low-income schools. First, the teachers provided us with a "reality testing situation" for determining whether certain patterns of choices were expected in their classrooms. Their statements about the social determinants underlying these patterns verified some of our expectations concerning non-academic influences upon choice behaviors and suggested

that future research should identify the specific social factors which occur in different instructional situations. Secondly, the recommendations related to promoting closer coordination between the CAI research and the classroom reveal that our project should move towards attaining an improved balance between research and development activities. The development aspect of our CAI work might emphasize two basic activities: (1) constructing programs which can be coordinated with the classroom curriculum, and (2) designing instructional techniques which can improve children's decision-making skills. Clearly, such movements from the laboratory to the classroom also require the development of training programs that will enable teachers to effectively apply our research results to their classrooms. It is expected that future teacher feedback sessions will produce helpful ideas concerning how to effectively apply the research on decision-making and engagement to developing teacher programs in low-income schools.

# APPENDIX A

# DESCRIPTION OF THE CAI ENGAGEMENT STUDY

COMPONENT RESUME
(Revised from Basic Program Plan, 3/31/72)

Component Code: R15S3B
Institution: Stanford Center for Research and Development in Teaching
Date Prepared: 1/24/73

Program Title: Teaching Students from Low-Income Areas

Component Title: Engaging Features of CAI Situations

Start and end dates of proposed Component: 9/71 - 11/73

Staff member in charge: M. D. Fisher, R. D. Hess

Problem. Educational settings which enable children to choose the difficulty levels of their curriculum may produce higher levels of motivation and engagement than settings which do not provide such choices. In this regard, no rigorous research information is available concerning how low-income students' use of educational choices affects their levels of classroom engagement.

Objectives. Utilize Computer Assisted Instruction to: (1) Study how engagement is affected by giving children control over the difficulty levels of their arithmetic problems. (2) Identify sub-groups of children in terms of whether they make choices of problem difficulty levels that improve or interfere with their learning of CAI arithmetic problems. (3) Determine how children's sense of efficacy, as indicated by locus of control scores, is related to their engagement levels and the patterns of choices which they make. These patterns include children who either select: "harder" problems although they rarely solve them correctly or "easier" problems which they seldom answer incorrectly.

Strategy. (1) Design a computer program which will allow children to select the difficulty levels of their arithmetic problems. The curriculum for this program will be based upon Suppes' Math, Drill and Practice Exercises.

(2) Develop a locus of control instrument which measures children's attitudes concerning how much control they have over their success in learning of arithmetic problems. (3) Place experimental (choice) and control (non-choice) groups on the computer for a period of 15 days. (4) Administer the locus of control instrument to these children and record their levels of engagement-disengagement while they work on the machines.

Projected outcomes. This study will provide information concerning how the choice of problem difficulty levels affects student engagement. It will also enable us to identify distinct patterns of choice behavior and to determine whether these patterns are related to locus of control and engagement scores. These findings can also provide teachers with specific choice patterns of different children and their reasons for making certain choices. This information can be utilized by teachers to identify children who must receive training in order to improve their learning in choice situations.

Milestones.

1. Completion of data collection for CAI study -- 5/73
2. Completion of Technical Report on CAI engagement study -- 12/73
3. Completion of dissemination activities to researchers and teachers of CAI data -- 5/74

# Engaging Features of CAI Situations

The CAI research component has been investigating some of the factors which we think are important in teaching, and that may stimulate the natural curiosity of children and help engage them in academic tasks. We have been operating two teletypes at Mayfair Elementary School in San Jose, California, using the computer to simulate educational settings in which the pupils can exert control over their learning activities. The task of the study has been to evaluate the effects of these settings upon student engagement.

Much has been written within the last ten years concerning: the child's control over his learning destiny; and how this type of control can produce higher achievement levels in school and increased satisfaction with learning academic subjects. However, rigorous research has not been conducted upon how the opportunity to control the learning activities affects motivation. Does increased control over different learning activities produce increased motivation? This is the basic question that we are attempting to answer with our Computer Assisted Instruction research. We think that the computer is one of the most rigorous instruments for investigating this issue. Therefore, the answers which are obtained from our research should yield clear-cut data about the effect of the student's control of his learning upon levels of engagement.

## 1971-1972 Study

Our initial research on the effects of choice upon student engagement began in February 1972 and will continue through May 1973. During this period we set up a computer project in a low-income school of San Jose and developed a computer program which would give children control over the difficulty levels of their arithmetic problems. Initially, we randomly selected similar numbers of boys and girls for two conditions: a) Control

of Difficulty Levels (N=30); and b) No Control of Difficulty Levels (N=21). The subjects in both of these groups worked arithmetic problems for one half hour per day during a ten day period. At the end of each five minutes, the computer program asked them if they desired to stop or continue working problems. In addition, subjects offered "choice" were given a second question after every five minute period that asked them if they wanted "harder," "easier," or the "same" types of problems than they previously worked. The computer was programmed to maintain the "no choice" group at about a 70% correct level while the "choice" group started at approximately the 50% correct level (during the first five minute period) and could then select problems that were either 15% harder or easier than those solved during the previous five minute period.

Some of the data collected in this study were the: (1) observations of student engagement and disengagement; and (2) choices of difficulty levels made by subjects who received the second question. Figures 1 and 2 indicate the engagement and disengagement levels for the Control and No Control of Difficulty Levels groups.

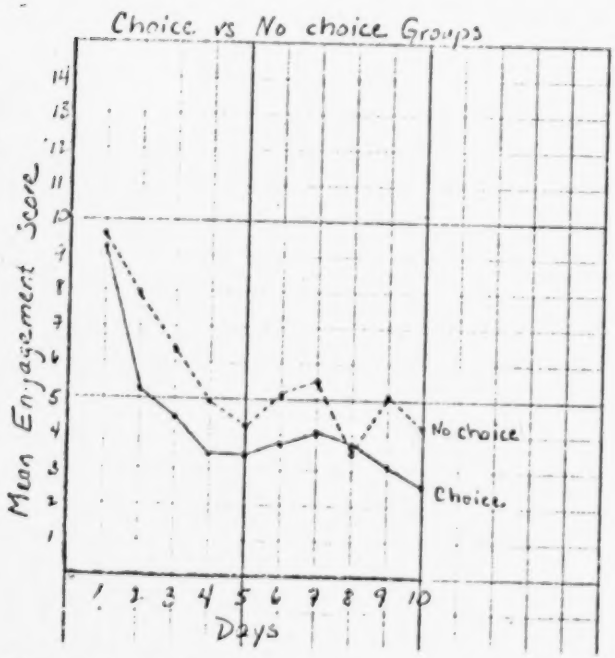


Figure 1. Engagement Levels by Days.

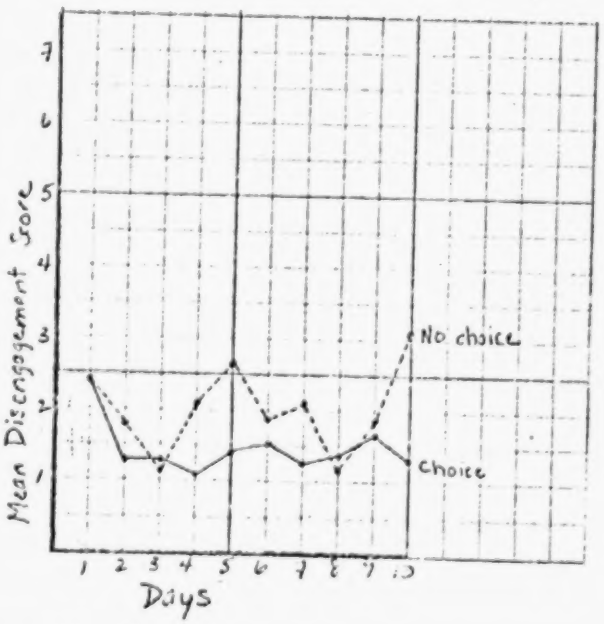


Figure 2. Disengagement Levels by Days.

The engagement and disengagement scores were based upon observations which were made during every ten second period while the children worked on the teletypes. The engagement scores were based upon such behaviors as reading problems silently, talking to self about problems, and counting on fingers. The points on the graphs represent the average number of occurrences of these behaviors per five minutes during each daily session. The graphs in Figure 2 were based upon indicators of disengagement. They included such behaviors as"turns away from the teletype"and"looks away from the teletype." These data indicate that the two groups maintained similar levels of engagement during the ten day period, i.e., there were no significant day-to-day differences between the groups and the decreases in engagement from days one through ten were similar. Although the "No Choice" group showed greater fluctuations in disengagement than did the "Choice" group, the differences between these groups was not significant.

An analysis of the types of choices made by the Control of Difficulty Levels group showed a consistent pattern. Seventy-five percent of the choices for nine subjects appeared to maximize success: they were the "same" or "easier" even though their percentage correct was between 65-100%. Another group of seven subjects ("Minimizers") appeared to minimize their performance; 87% of their choices were the "same" or "harder" when their percentage correct was between 0-64%. To help understand the basis for their choices we designed an interview questionnaire for the current year to determine why the subjects made certain types of choices.

The results of the engagement and choice data for 1971-1972 have caused us to modify our techniques for studying student engagement and programming the computer. Thus, more distractors (such as toys and pictures) have been placed in the CAI room this year in order to provide the children with more variable stimuli than were present last year. These new stimuli may produce more variability between the groups in this year's study because they now

have available some objects which can draw their attention away from the computer. The program this year has been modified so that the subjects now change the grade levels of the problems rather than their percentage correct. The classification of problems by grade levels has been developed by Suppes, and this change in our criterion for selecting problems has produced almost 100% control over the choice of problems at various grade levels. Another important modification in our study for this year has occurred in our experimental design (which is described in the next section of this paper). We have now attemped to control for the effects of working different sequences of problems by using a Yoked Control group which receives identical sequences as the Control of Choices group.

Additional changes in our study for this year allow us to gather more extensive baseline engagement data than last year and to control the number of days which all children spend on the machines.

1972-1973 Study

This study includes two groups consisting of twenty subjects (equally divided between boys and girls) per group. All of the subjects will receive the Math, Drill and Practice Program and run for a maximum time of fifteen days at 35 minutes per day. The experimental conditions are as follows:

1. Control of Difficulty Levels Group -- The subjects in this group have been randomly selected and their starting points are at the first grade level. They will receive three questions (which have been written into the program) after they have worked on the teletypes for 15, 20, 25 and 30 minutes. The questions are: "Do you want more problems? Do you want harder, easier or the same types of problems? Do you want a little,

a medium amount or a lot harder/easier problems?" (Level of difficulty is adjusted by .3, .6 or .9 of a grade level increments or decrements.)

After their first 15 minutes on the teletype during day one, the subjects can elect to continue the lesson or terminate. If they select the "don't want to continue" option, the program stops working and they return to their classrooms. Questions two and three refer to the grade levels of the previously worked problems. The selection of "harder" or "easier" problems will change the grade levels of the problems which are presented during a subsequent time interval. However, the computer has been programmed to remain at constant grade levels within each time interval.

After these subjects have completed working on the computer, they are interviewed to determine why they decided to stop working, and why they made the choices they did. The last question in this interview is concerned with whether they like to solve arithmetic problems on the computer. The primary purpose of this interview is to assist in interpreting data on the children's performance on the computer. However, these questions do not yield the most rigorous types of data (for studying engagement and disengagement behavior) which result from this research.

2. Yoked Control Group -- The subjects in this group have been matched as closely as possible to particular subjects in Group I. The criteria utilized for matching are CA, sex of subject, achievement test score, grade, teacher and ethnic background. The starting points for these subjects are identical to that of the "choice" group. But they do not have options which allow them to stop working or to select the difficulty levels of their problems. In addition, their programs are set up to continue working as long as their cohorts worked, and the difficulty levels of their problems

follow identical levels chosen by their cohorts. This control group enables us to control for the difficulty level sequences which the subjects in Group I select, since the subjects in Group II have identical sequences. Therefore, our comparisons will show whether the opportunity to choose problems of various difficulty results in higher levels of engagement and a greater sense of efficacy and control. This group will also be interviewed to determine why they think certain choice patterns can occur among different subjects, and their preferences for working on the computer will be recorded.

Measurement Instruments

1. Engagement Observation Scale -- Observations are made during every 10 second period while the children work on the teletypes. These data indicate various types of behavior which the children show during this time period, and these behaviors have been classified into engagement and disengagement categories. Some examples of these categories are: (1) Engagement behavior -- Eyes on teletype paper, talks to self about problems and pulls closer to the teletype; (2) Disengagement behavior -- Turns away from the teletype, looks away from the teletype and yawns.

2. Locus of Control Test -- This test has been designed to measure whether the children believe they: (1) are responsible for their success or failure in learning arithmetic and (2) can control the computer program. Part I (general measure of Locus of Control) is given on day one before all the children begin working on the computer and Part II (specific LOC measure related to work on the computer) is given on days three and eight before they start working on the computer. Both Parts I and II are administered on the day after they have finished working the problems.

Research Questions which Compare the Performance of the Control of Difficulty Levels (I) and Yoked Control Groups (II)

1. Does the opportunity to choose various difficulty levels of arithmetic problems increase engagement and decrease disengagement?

More specifically, does Group I show higher levels of engagement and lower levels of disengagement than Group II? Comparisons between these groups will be made during each of the fifteen daily sessions. If Group I has higher engagement and lower disengagement scores than Group II, we can conclude that giving children choices of difficulty levels yields higher levels of engagement than conditions in which they have no choices, and the differences are not caused by changes or non-changes in the difficulty levels of the problems.

Does the opportunity to choose difficulty levels of arithmetic problems encourage students to remain on the computer for similar amounts of time between days one and fifteen? This result might indicate that the subjects have maintained similar engagement levels from days one through fifteen. However, the time data will be closely analyzed in relation to the engagement data, the reasons for stopping which are given by the children on each day and during their interviews.

2. Does giving children the choice of difficulty levels affect their locus of control?

More specifically, does Group I believe that learning outcomes are the result of more systematic sources of control than Group II? Does Group I attribute the locus of control more frequently to itself than does Group II? These questions will be answered by determining whether changes in the LOC Test scores occurred from the first to last administrations, and comparing

the three groups in terms of differences in the amount of change.

3. Do identifiable choice patterns emerge?

The patterns which might be identified are: (1) Maximizers -- Subjects who continually choose easier problems (maximize success) although their performance level is 90% correct or greater, and (2) Minimizers -- Subjects who continually choose harder problems (minimize success) although their performance level is 50% correct or less. These sub-groups will also be compared for possible differences between their mean engagement levels and locus of control scores.

Future Directions of the Project

Although our computer program provides us with a rigorous technique for studying the effects of choice situations upon student engagement, it appears that research concerned with adults who are responsible for providing such choice situations for children will yield information which is also related to classroom behavior. Therefore, future research in this project might be concerned with the "controllers" (teachers, parents) of potential choice situations. One of the goals of this research might be to identify parents and teachers who allow relatively large and small degrees of choice, and study the classroom behavior and achievement of their children. There appear to be other educationally significant choice situations which can be investigated by using the techniques developed in this program. For example, the effects of the voucher system and the use of student-teacher contracts might be studied to determine the conditions under which these types of choice situations increase student engagement.

Our conversations with teachers and observations of children working on the teletypes suggest that we should concentrate on the social correlates

and educational consequences of choice. In regard to the first, we have observed children who will select "easier" problems in order to produce the longest teletype printouts, and teachers have indicated to us that social-status factors influence their students' choices of textbooks (they want to be seen carrying a book which contains difficult assignments). It appears that these social-status factors might have more important influences upon the children's choice behavior than academic and achievement factors. Investigations of the educational consequences of choice would be concerned with relating student engagement and achievement to various choice parameters.

# APPENDIX B

## QUESTIONNAIRE DEVELOPED FOR CAI FEEDBACK SESSION

BY
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Project 3B: CAI Engagement: Research Project
Teaching Students from Low-Income Areas

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# Teacher's Experiences with the CAI Project

One of this project's aims is to design and implement studies that are mutually beneficial to school personnel and researchers. This questionnaire attempts to gather information on the following aspects of teacher's experiences with the CAI project:

(1) Working Relationships between School Staff and Researchers

(2) Usefulness of the project in on-going teacher and student activities

(3) Relevance of the workshop presentations to classroom teaching

Please help us to evaluate our efforts and to improve future research by responding to this questionnaire. Thank you for your cooperation in our work.

Teachers' Experiences with the CAI Project

I. Working Relationships between Researchers and School Staff

1. Looking back on the contract upon which you and the research staff agreed, do you think it: (Check one only)

____ covered all relevant details.

____ was incomplete, did not cover some important details. Please specify which details, in your opinion, were not covered in the contract: _____

_____

2. Looking back on the contract upon which you and the research staff agreed, do you think the terms were: (Check one only)

____ carried out as stated in the contract.

____ violated in the course of the research. Please specify how the contract, in your opinion, was violated: _____

_____

3. Looking at the project now, did you get enough information about it before you decided to participate? (Check all that apply)

____ I would have liked more information on _____

_____

____ I understand the project objectives differently now than at the time I decided to participate. My original impression of the project objectives was _____

_____

____ I got all the information I needed before my decision to participate.

4. Did you have any contact with the observers from the CAI research project?

____ Yes

____ No

5. If you answered "yes" in Question 4 above, what was the nature of your contact with the observers?

____ The observers were able to answer my questions about the research project.

____ The observers came to the classroom to escort students to the computer.

____ Other. Please specify _____

_____

6. Please tell us any thoughts you may have on how the working relationship between the school and research staff can be improved in future studies

_____

_____

II. Usefulness of the Project in On-going School Activities

A. Relation of the CAI Project to Teachers' Activities

7. Did you feel that your teaching was disrupted by the requirements of the research schedule?

____ Yes, very much

____ Yes, a little

____ No

8. If you answered "yes" in Question 7, please tell us in what ways your teaching was disrupted_____

_____

_____

9. If you answered "yes" in Question 7, please tell us how the disruption to your teaching can be minimized:_____

_____

_____

10. Do you feel your students' learning in the classroom was disrupted by the requirements of the research schedule?

____ Yes, very much

____ Yes, a little

____ No

11. If you answered "yes" in Question 10, do you have any ideas for minimizing the disruption experienced by your students?

_____

_____

12. Do you think what your students learned with CAI was consistent with your objectives and content for arithmetic in the classroom?

____ Yes

____ I am uncertain

____ No

13. If you answered "no" in Question 12 please indicate in what way(s) the CAI programs were inconsistent with your own teaching:

_____

_____

14. Did you have the opportunity to work with the CAI arithmetic programs at the computer terminals?

____ Yes

____ No. (Please explain why you did not have the opportunity to work with the computer.) _____

_____

B. Relation of the CAI Project to Student Activities

15. During the hours which were not being used for the research project, did your students use the computer?

____ Yes, I sent my students to the computer for CAI drill.

____ Yes, my students used the computer under the supervision of Mr. Schultz.

____ No, my students did not use the computer outside of the research schedule.

16. Do you think that your students who participated in the CAI project were more engaged in their arithmetic lessons in the classroom than your students who were not involved in the research?

____ Yes.

____ I am uncertain.

____ No.

17. Did you and your students talk about their experiences with the computer?

____ Yes.

____ No.

If you answered "yes" in Question 17, which of the following did you and students discuss? (Check all those that apply.)

____ The observers from the research project.

____ The content of the CAI programs.

____ The operation of the computer terminals.

____ The schedule for working with the computer.

____ How the students felt about working with the computer.

____ Other. (Please specify.) _____

_____

18. Which of the following sentences best describes your students' feelings toward working with the computer?

____ My students looked forward to working with the computer.

____ My students were reluctant to work with the computer.

____ I am not certain how my students felt.

____ Other. (Please specify.) _____

_____

III. Presentation of Findings in Workshop

19. Did today's workshop provide you with adequate information regarding the objectives of this project?

____ No

____ Partly

____ Yes

20. If you answered "no" or "partly" in Question 19, were the presentations

____ too technical

____ incomplete

____ unclear

____ too much information was provided

21. If you answered "no" or "partly" in Question 19, please indicate the kind of information you would have liked to receive:

_____

_____

22. Do you think that the information provided in the workshop would be of interest to teachers whose students did not participate in this project?

____ No

____ Probably not

____ I am uncertain

____ Probably yes

____ Definitely yes

23. The Student Engagement Instrument was described in this morning's workshop. Please check which of the following behaviors -- in your judgment as a teacher -- is characteristic of student engagement or disengagement in learning. (Please check only one category for each behavior.)

| | Behaviors | Characteristic of Engagement | Characteristic of Disengagement | Characteristic of both Engagement and Disengagement | Not a Characteristic of Engagement or Disengagement |
|---|---|---|---|---|---|
| a. | Eyes on Paper | | | | |
| b. | Touches Keys of Terminal | | | | |
| c. | Pulls Chair Closer to Terminal | | | | |
| d. | Touches Paper | | | | |
| e. | Turns Away | | | | |
| f. | Reads Silently | | | | |
| g. | Talks to Self Regarding the Problem | | | | |
| h. | Counts on Fingers | | | | |
| i. | Expresses Surprise | | | | |
| j. | Looks away | | | | |

24. Please describe any additional behaviors of engagements which you think should be added to the present instrument: _____

_____

_____

25. Which of the following workshop presentations will be most useful to your classroom teaching in the future?

(Please rank them 1 - 4 in order of usefulness.)

____ Information on Observation Scale

____ Information on Choice

____ Information on the Interviews

____ Information on Achievement Tests

26. Please describe in what ways the information you ranked 1 in Question 25 will be useful to your classroom teaching: _____

_____

_____

27. As a result of today's workshop, would you change some of the ways in which you teach your class?

____ No

____ Probably not

____ I am uncertain

____ Probably yes

____ Definitely yes

28. If you answered "probably yes" or "definitely yes" in Question 27, please describe the ways in which you intend to change your teaching:

_____

_____

_____

29. In your opinion, can the research results reported today be applied by teachers to maintain student interest in classroom instruction?

____ No

____ Probably not

____ I am uncertain

____ Probably yes

____ Definitely yes

30. Do you think that educational research can produce knowledge which is useful for teachers and classroom instruction?

____ No

____ I am uncertain

____ Yes

31. Would you consider participating in future research projects conducted by this staff?

____ Yes

____ No. Please give the reasons why you would not participate in future research studies: _____

_____

_____

32. Please comment on any aspect of the CAI project and this morning's workshop which you think might help us improve (1) our future research and (2) our relationships with school staffs and students.